

REMARKS

Claim 14 has been amended. Claims 1-14 are pending in the application.

Rejections under 35 U.S.C. 112

Applicants request reconsideration and withdrawal of the rejection of claim 14 under 35 U.S.C. §112, second paragraph, as being indefinite.

Applicants have amended claim 14 to specify that the relatively dry ethanol stream have a water content of less than about 5 mol %. Support for this amendment is found on page 8, lines 26-27 of the specification.

Furthermore, the word "the" has been removed from the phrase "the removal of water therefrom" in claim 14 to obviate any antecedent basis issue.

Applicants request reconsideration and withdrawal of the rejection of claims 1-14 under 35 U.S.C. §112, second paragraph, as failing to set forth the subject matter which applicants regard as their invention.

Applicants are not required to further delineate the process steps as already specified in claim 1 which define the subject matter that applicants regard as their invention, including the recovery of a first distillate containing no more than about 10 mol% water. As would be understood by one of ordinary skill in the art, there are a myriad of possible process factors and conditions that impact the recovery of a first distillate containing no more than about 10 mol% water from the first distillation zone. Nevertheless, design and operation of a pressure swing distillation system capable of recovering a first distillate containing no more than about 10 mol% water from the first distillation zone is fully within the

skill of those skilled in the art upon reading applicants' disclosure depending on a variety of system factors and conditions including, for example, the composition of the feedstock, the design of the distillation column or columns forming the respective distillation zone (in particular, upon the number of theoretical stages in the column), upon the heat supplied for reboiling purposes, and upon the operating pressures. See, for example, page 9, line 28 to page 11, line 4 of the application.

Rejection under 35 U.S.C. 103(a)

Applicants request reconsideration and withdrawal of the rejection of claims 1-14 under 35 U.S.C. §103(a) as obvious over EP 0 151 886 ("EP '886") with or without JP 5186392 ("JP '392").

Applicants have previously discussed and characterized the invention as defined in independent claim 1 and the disclosure in EP '886 and JP '392 in their responses filed August 27, 2007 (Amendment D), October 9, 2006 (Amendment C) and November 16, 2004 (Amendment B).

As previously noted by applicants, the requirement of step (d) in independent claim 1 of recovering a first distillate comprising ethyl acetate, ethanol, and not more than about 10 mol% water from the first distillation zone is an affirmative restriction that in part defines the manner in which the pressure swing distillation process is carried out. That is, the not more than about 10 mol% water limitation is a restriction that must be observed in the practice of the pressure swing distillation system to satisfactorily achieve the goal of the invention (i.e., purification of ethyl acetate from a feedstock comprising ethyl acetate, ethanol and water).

Applicants maintain that the requirement in claim 1 that the first distillate recovered from the first distillation zone contain no more than about 10 mol% water is not an obvious optimization of a process parameter as the Office contends. In order to be subject to optimization, a particular process parameter must be first be recognized by the prior art as a variable that achieves a recognized result. See MPEP §2144.05(II) (B). The cited art does not establish that variation of the water content in the first distillate recovered from the first distillation zone is a result-effective variable.

On page 3 of the Office action, the Examiner refers to the disclosure at page 14, lines 17-18 of EP '866 of the presence of "water of known composition." However, this quoted language simply refers to a mixture of ethanol, acetaldehyde, ethyl acetate and water used to calibrate the chromatography instrument used in the Examples to analyze the reaction mixture resulting from the catalytic dehydrogenation of ethanol. Later, at page 14, line 25, EP '866 discloses that ethanol, acetaldehyde, ethyl acetate and water, were detected in the reaction mixture. However, even if water were present in the feed stream to the pressure swing distillation system of EP '886 (which applicants do not concede)¹, this mere mention of water in the reaction mixture does not identify water content in the first distillate recovered from the first distillation zone as a result-effective variable, much less teach or suggest that by

¹ As previously pointed out by applicants, the portion of the specification of EP '886 that describes the pressure swing distillation process (See pages 10-11 of EP '886, in particular the paragraph spanning pages 10-11) makes no reference to the presence of water in the feed, nor to the formation of a binary azeotrope with ethyl acetate or a ternary azeotrope with ethyl acetate and ethanol that have boiling points close to that of ethyl acetate as would be expected.

maintaining the water content of the first distillate below a certain maximum, the pressure swing system may advantageously be practiced in a manner that provides for recovery of purified ethyl acetate from a feedstock comprising ethyl acetate, ethanol and water.

Moreover, apart from the lack of teaching in the cited art that water content in the first distillate is a result-effective variable, applicants' claimed invention is contrary to the conventional knowledge of those skilled in the art such that optimization as postulated by the Office does not result from "an experimentation of an obvious nature." As taught by the applicants:

Although it might be expected that it would be beneficial to design the first distillation zone so that the first distillate has a composition which is close to or at the composition of the ternary azeotrope at the operating pressure of the first distillation zone, this surprisingly proves not to be the case. **Instead it is better to design the first distillation zone such that the first distillate has a composition which has as low a water content as is practicable.** Not only can the heat input to the first distillation zone be substantially minimised in this way but also the distillation column or columns constituting the first distillation zone requires or require a reduced number of theoretical distillation stages. Hence both operating costs and construction costs can be minimised. In addition operation so that the first distillate has a composition near the ternary azeotrope is somewhat tricky to achieve because the composition of the distillate can readily change significantly with minor variations in operating conditions. Hence it may be difficult to achieve stable operation of the first and second distillation zones under such conditions. **On the other hand operation of the first distillation zone under conditions such that the water content of the first distillate is as low as practicable proves not to be so susceptible to minor changes in operating**

conditions so that stable operation of the plant is more readily achieved.

See page 10, line 10 to page 11, line 4 of the application (emphasis added).

That is, contrary to conventional knowledge, including the disclosure of EP '886, suggesting to the skilled artisan to design a system in which the composition of the first distillate is close to the composition of the ternary azeotrope, it has been discovered that the claimed process achieves effective purification of ethyl acetate from a feedstock comprising ethyl acetate, ethanol and water by operation of the first distillation zone such that the first distillate has a composition which has as low a water content as is practicable.

On pages 3 and 4 of the Office action, the Office makes reference to applicants remarks in Amendment C, filed August 27, 2007, that design and operation of a pressure swing distillation system capable of recovering a first distillate containing no more than about 10 mol% water from the first distillation zone is fully within the skill of those skilled in the art upon reading applicants' disclosure. However, contrary to the implication in the Office action, this fact does not support the contention that applicants' invention is therefore a mere optimization of the disclosure in EP '866. Nothing in EP '866 teaches or suggests maintaining the water content of the first distillate at not more than about 10 mol %, nor the attendant benefits obtained when the modified pressure swing distillation system is used in purifying ethyl acetate from a feedstock comprising ethyl acetate, ethanol and water. As noted above in connection with the rejection under 35 U.S.C. §112, second paragraph, once the skilled person has been provided with the

teaching in applicants' specification of recovering a first distillate having as low a water content as is practicable (i.e., containing no more than about 10 mol%), design and operation of the first distillation zone of the pressure swing system to achieve this claimed requirement falls fully within the skill of those skilled in the art.

On page 4 of the Office action, the Examiner contends that "the specification did not mention the criticality of the argued mol%." This simply is not the case. As noted in the language from the specification at page 10 line 10 to page 11, line 4 quoted above, applicants teach that in accordance with the claimed invention the first distillation zone is to be designed and operated such that the first distillate has a composition which has as low a water content as is practicable and that significant benefits are thereby attained.

In view of the above, applicants respectfully request withdrawal of the rejection under 35 U.S.C. §103(a) and allowance of claims 1-14.

The Commissioner is hereby authorized to charge the two-month extension of time fee in the amount of \$460.00 to Deposit Account No. 19-1345. The Commissioner is authorized to charge any fee deficiency or overpayment in connection with this amendment to Deposit Account No. 19-1345.

Respectfully submitted,

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